



(12) **United States Patent**
Alluboyina et al.

(10) **Patent No.:** **US 10,817,380 B2**
(45) **Date of Patent:** **Oct. 27, 2020**

(54) **IMPLEMENTING AFFINITY AND
ANTI-AFFINITY CONSTRAINTS IN A
BUNDLED APPLICATION**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(71) Applicant: **Robin Systems, Inc.**, San Jose, CA
(US)

4,310,883 A 1/1982 Clifton
5,602,993 A 2/1997 Stromberg
(Continued)

(72) Inventors: **Ravi Kumar Alluboyina**, Santa Clara,
CA (US); **Dhanashankar Venkatesan**,
San Jose, CA (US)

FOREIGN PATENT DOCUMENTS

WO WO2017008675 1/2017

(73) Assignee: **ROBIN SYSTEMS, INC.**, San Jose,
CA (US)

OTHER PUBLICATIONS

Segment map

(Continued)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

Primary Examiner — Hiep T Nguyen

(74) *Attorney, Agent, or Firm* — David R. Stevens;
Stevens Law Group

(21) Appl. No.: **16/050,655**

(57) **ABSTRACT**

(22) Filed: **Jul. 31, 2018**

A new snapshot of a storage volume is created by suppress-
ing write requests. Once pending write requests from the
computing nodes are completed, storage nodes create a new
snapshot for the storage volume by allocating a new segment
to the new snapshot. Subsequent write requests to the
storage volume are then performed on the segments allo-
cated to the new snapshot. An orchestration layer imple-
ments a bundled application that is provisioned with storage
volumes and containers. A snapshot of the application may
be created and used to rollback or clone the application. The
amount of processing cores, memory, and containers may be
increased or decreased based on usage. Components of the
bundled application may be assigned to nodes to satisfy
affinity and anti-affinity rules. Device sets may be generated
according to these rules and used to plan for the assignment
of storage volumes and containers of the bundled applica-
tion.

(65) **Prior Publication Data**

US 2020/0042392 A1 Feb. 6, 2020

(51) **Int. Cl.**

G06F 11/14 (2006.01)

H04L 12/24 (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **G06F 11/1435** (2013.01); **G06F 9/45558**
(2013.01); **G06F 9/5033** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC .. **G06F 11/1435**; **G06F 11/1464**; **G06F 16/27**;
G06F 9/45558; **G06F 9/5077**;

(Continued)

20 Claims, 29 Drawing Sheets

